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NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS SECONDARY ANALYSIS GRANT PROGRAM

General Competition
CFDA Number: 84.902B

SUPPLEMENTAL INFORMATION

CLOSING DATE: January 19, 2000

SUPPLEMENTAL MATERIALS FOR THE 2000 NATIONAL ASSESSMENT OF EDUCATIONAL PROGRESS SECONDARY ANALYSIS GRANT PROGRAM

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ADVICE TO NAEP SECONDARY ANALYSIS GRANT APPLICANTS

Introduction

The purpose of the NAEP Secondary Analysis Program is to encourage researchers to use existing approaches and develop new ideas for analyzing and reporting on the data from NAEP and the NAEP High School Transcript Studies. The NAEP data are a rich source of information on the academic achievement of U.S. 4th-, 8th- and 12th-graders, but they are not easy to analyze. Special procedures are required to accurately estimate even simple statistics such as means and correlation coefficients. If you are not already familiar with the complexities involved in NAEP analysis, the NAEP staff recommends that you read "Conducting Statistical Analyses of the NAEP Data" from the NAEP Data Users' Guide before writing your grant proposal. A copy of this chapter is available from the grant project officer upon request.

Purpose of this Document

This short advice sheet is designed to help applicants avoid land mines that have seriously damaged past applications. However, if you have specific questions about your application, please feel free to contact the project officer **Alex Sedlacek, Ph.D., 202/219-1734 or via e-mail at alex_sedlacek@ed.gov**

Advice to applicants:

1. Read the grant application materials.

A surprising number of people complete grant applications without reading the instructions, but it is not safe to assume that this grant program is exactly like others you have applied for. Before putting hours into preparing your application, read the instruction materials, so you know exactly what information NCES needs from you.

2. Describe your project in our terms.

Grant applications do not compete with one another for funding. Each application is: (1) rated on the Evaluation Criteria presented in the application package, and (2) ranked on the basis of points earned. The surest way to get a high rating for your project is to explain it in terms of the criteria our reviewers are required to use when rating your application. It is to your advantage to address each sub-criterion on our list in your application narrative. Do not assume our reviewers will automatically recognize "the conceptual framework that underlies the project" you are proposing. Make sure your application narrative describes your framework clearly.

3. Describe your project fully.

The most important evaluation sub-criterion is (1c). To receive funding from this program, you must convince our reviewers that you can and will "use appropriate theoretical and methodological tools" when analyzing the NAEP data. Generic phrases like "our project will address the sampling error and measurement error in NAEP" will NOT satisfy sub-criterion (1c). Your application narrative should describe your proposed analyses specifically enough to assure our reviewers that you understand the obstacles to analyzing the NAEP data well enough to

overcome them. Fr example, be sure you distinguish between overall weights and replicate weights in your discussion of NAEP analysis. If your application narrative misuses basic terms, confuses essential elements of the NAEP design, or proposes to apply sophisticated statistical techniques without explaining how you will modify them to accommodate the NAEP data, your application is unlikely to be funded.

4. Don't assume professional credentials alone will assure you funding.

All applicants should take the time to describe the project they are proposing thoroughly. Do not rely solely on your professional reputation and experience no matter how stellar they may be. You must explain the project you are currently asking NAEP to fund specifically enough that our reviewers would recognize its feasibility and merit even if someone else had proposed it.

5. Include TWO trips to Washington, D.C. in your travel budget.

For fiscal year 1998, and all future secondary analysis grant cycles, NCES will be sponsoring a conference showcasing the results of grant research. NCES will strongly encourage all grantees to participate in this conference. Please include two trips to Washington, D.C. in your request for travel funds for your project--one trip to attend the peer review meeting on your final report, and one to present your results at our research conference. The peer review meeting lasts two hours. It will not require that you stay overnight in Washington. The research conference will consume a full day. If you prefer to stay over night, please include that expense in your budget request for the second trip. Assume the current government per diem rate for Washington, D.C.--$142.00 per day.

6. Follow our budget guidelines.

In the budget section of your application, **be sure to include** the percentage of the principal investigator and/or the project director's time that will be spent on the NAEP grant. Also be sure to include the government indirect cost rate for your organization, and whether that rate is fixed, final or provisional. Justify all budget requests fully. For example, if you are requesting funds for travel other than the two required trips to Washington, D.C., explain clearly how they relate to the purpose of the grant program, and of your project in particular.

Be aware that the NAEP Secondary Analysis Program was not designed to purchase hardware (e.g., computers, printers, tape drives, scanners, etc.) for researchers. Budget requests for such equipment are typically denied, but if you choose to make such a request, the special circumstances in your project which justify the request should be explained thoroughly.

7. Follow our format guidelines.

It is to your advantage to comply with the Secretary of Education's guidelines for preparing your application narrative. Your narrative should be **double spaced** and the text should appear on **only one side of each page**. The application packages **should not be bound**--NCES must duplicate your entire application for submission to as many as five reviewers. Your application narrative **may not exceed 60 pages**. This page limit is absolute. Consequently, you should be brief but thorough.

8. Use NCES as a resource in preparing your application.

It is in your best interests to use all the resources available to you as you prepare your application narrative. If you have questions about the grant program, the Federal forms, or preparation of your application narrative, feel free to contact the project officer. You may also want to consider requesting copies of applications that were funded in past years--funded grant applications are government property, and may be requested under freedom of information law.

If you have further questions, contact: Alex Sedlacek, Project Officer, at 202/219-1734 or via e-mail at alex_sedlacek@ed.gov

NAEP SECONDARY ANALYSIS GRANT ABSTRACTS

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Projects Funded in FY 99

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Organization: University of Massachusetts - Amherst
Prncpl Researcher: Hariharan Swaminathan
Project title: Impact of Errors in Item Parameter Estimates on the Estimation of Ability in NAEP

Project: This project has two major components. It will: (1) investigate the impact of errors made in the estimation of item parameters on the accuracy of the proficiency score distributions used for reporting NAEP results, and (2) develop and study a procedure for creating proficiency score distributions which takes into account the errors in parameter estimation which occur during the estimation procedure.

Organization: Rand Corporation
Prncpl Researcher: David Grissmer
Project title: Analyzing State NAEP Data to Identify State Educational Policies/characteristics which Cost-effectively Increase Achievement

Project: This project will use the most recent NAEP data available to study why some states are making much larger gains in math and reading than other states, and why students with similar family characteristics score so differently across states. This work will expand the case studies of specific states previously conducted by the applicant to include six additional states selected for their particularly high or low growth rates in achievement or their high or low estimated achievement scores for students from comparable backgrounds.

Organization: American Institutes for Research
Prncpl Researcher: Jon Cohen
Project title: A Hypertext Textbook for NAEP Statistical Methods

Project: This project proposes to develop an on-line, hypertext textbook covering existing and emerging NAEP statistical methods that can be deployed as part of the *AM* statistical package. The hypertext textbook will be a component of the *AM* software's help system. The textbook will allow users to immediately access explanations of the major components of the NAEP design and of the new estimation procedures on which the *AM* software is based. By helping researchers understand NAEP's underpinnings, this tool may significantly expand the NAEP user community.

Organization: Educational Testing Service
Prncpl Researcher: Barbara Storms
Project title: Analyzing Classroom Writing Assignments: Lessons Learned from the 1998 NAEP Classroom Writing Study

Project: This project will use the 1998 NAEP classroom writing study data to identify the key features of classroom writing assignments which appear to lead to high-level student writing performance. The goal of this work is to develop a model of writing assignments and general classroom writing practices that will be useful to school administrators, curriculum specialists, and classroom teachers.

Organization: University of Southern California
Prncpl Researcher: Eddie Ip
Project title: Assessing the Psychometric Effects of Item Clustering Around Passages in NAEP

Project: This project will investigate the impact of the effects of clustering items around reading passages on the estimation of NAEP proficiency scores. In addition identifying and measuring local dependency in the NAEP data, the study will develop an alternative estimation model which accounts for local dependency, and compare the ability of the new and the existing NAEP estimation models to estimate the latent structure of data which simulate the NAEP long term trend reading assessment.

Organization: University of Maryland
Prncpl Researcher: John Guthrie
Project title: Effects of Integrated Instruction and Reading Time on Reading Achievement in Middle School: A Policy Analysis of the NAEP Data

Project: This study will combine data from the 1994 NAEP reading teacher questionnaire and the 1994 student reading background questions to form constructs representing integrated instruction in reading, and student engagement with reading. The study will then investigate the relationship between these constructs and student reading achievement and attempt to develop a model of optimal instructional time and student reading time that could potentially reading achievement.

Organization: Educational Testing Service
Prncpl Researcher: Eiji Muraki
Project title: Application of Multiple-Group Generalized partial Credit Model to NAEP Linking Procedures

Project: One major objective of the NAEP is the measurement of trends in student performance across time. To achieve this, results of different assessment cycles are linked across time periods. The methodology used to equate scores during this linking can introduce error into the

estimates of student ability. This study will investigate the amount of uncertainty introduced into the NAEP ability distribution estimates by the linking strategy currently used in operational NAEP and several other strategies which have been proposed for operational linking.

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Projects Funded in FY 98

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Fed Id No: 80004
Organization: American Institutes for Research
Prncpl Researcher: Donald McLaughlin
Project title: Item-based Linked Scaling of NAEP and State Assessments

Project: This project proposes to use and evaluate a score-based linking method known as the "variant-item technique" to calibrate state assessment items directly onto the NAEP scale. If successful, this project will develop a more precise procedure for using a state assessments to measure achievement on the NAEP scale. This project will: (1) estimate the precision of item-based linkages, (2) assess the impact of systematic school-level variation on linkage accuracy, (3) assess the extent to which background information may be needed for a neutral scoring of state assessment items on the NAEP scale, and (4) characterize state assessment items that carry more and less weight in estimating the NAEP construct.

Fed Id No: 80011
Organization: Datametrics Research, Inc.
Prncpl Researcher: Neal Thomas
Project title: Assessing the Contribution of Background Data for Primary NAEP Reporting

Project: Extensive background information is used in all NAEP estimation procedures, but a relatively small number of these background variables are used in primary reporting. This study proposes to estimate how much accuracy is gained (or lost) in the primary reporting of NAEP by including (or excluding) extensive background data. The study will produces estimates of how many additional students would need to be sampled to retain the current accuracy of NAEP reports, if the background data are not used when forming primary reports. These estimates will result in a clear assessment of the costs/benefits of using background variables in primary NAEP reporting.

Fed Id No: 80010
Organization: CTB/McGraw-Hill
Prncpl Researcher: Richard Patz
Project title: Comprehensive Methodology for the Analysis of Rater Errors & their Impact on NAEP

Project: This project proposes to develop methodology that will: (1) use the second ratings or "double reads" of NAEP open-ended items to obtain more information about students; and (2)

to more appropriately quantify the error due to the rating process when open-ended items are used. The project will use a hierarchical rater model and an adaptation of an item-bundle modeling approach both of which were developed by the principal investigators. Software to implement these new procedures will be developed and publicly shared.

Fed Id No: 80001
Organization: Temple University
Prncpl Researcher: Jeremy Finn
Project title: Taking Mathematics in High School: Is Opportunity Equal?

Project: This project will use the 1994 NAEP Transcript study data in an attempt to examine the factors that affect mathematics course taking patterns--factors that promote course taking among some students while limiting the opportunities of others. The specific objects of the project are: (1) to identify mathematics course-taking patterns among high-school students; (2) to characterize the relationship of mathematics course-taking with family characteristics and school-related outcomes; (3) to identify inequities in course-taking according to the characteristics of students or their schools; and (4) to examine "alterable" school policies and practices that impact on students' course-taking decisions. The project proposes produce multiple reports on its findings targeted at researchers and policy makers.

Fed Id No: 80008
Organization: University of Maine
Prncpl Researcher: Jeakyung Lee
Project title: Understanding Rural Student Achievement: Identifying Instructional and Organizational Differences between Rural and Nonrural Schools

Project: This study proposes to examine the factors that have contributed to the recent improvement in rural student achievement and to identify the sources of the achievement gaps between rural and nonrural students. The study hypothesizes that rural schools, as compared to their nonrural counterparts, have both facilitative (e.g., small classes, supportive ethos, and safe/orderly climate) and constraining (e.g., lack of well-trained teachers and instructional resources and low availability of advanced courses) conditions which mediate the impact of their locational "disadvantage" on student achievement. The study will build on its research findings by proposing alternative ways of reporting state-level NAEP results that provide insights into the problems faced by rural and nonrural communities and methods which may help the unique problems of each group.

Fed Id No: 80006
Organization: University of Maryland
Prncpl Researcher: John Guthrie
Funds Requested: $109,072
Project title: Effects of Reading Time and Instruction on Reading Achievement: A Policy Analysis of the NAEP Data

Project: This study proposes to use the nationally representative NAEP data set to investigate the relationship between time spent reading and student reading achievement. Both the direct hypothesis, assumed by many standards-based school reform movements, that increased reading time relates directly to higher reading achievement and more complex hypotheses involving the mediating affects of classroom instructional practices will be investigated. The goal of the study is to produce useful information which will inform the decisions of states and school districts regarding the allocation of in-school time to reading instruction and the integration of reading into the curriculum.

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Projects Funded in FY 97

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Fed Id No: 70003
Organization: University of Chicago
Prncpl Researcher: Larry Hedges
Project title: Adjustments of Group Differences for Social context in NAEP 9 & 13 Year Old Samples

Project: This study will attempt to help determine whether adequate adjustments for social context are possible in the 9 and 13-year-old samples using the current NAEP background data, and if not, whether the collection of more complete data (additional questions) or more reliable date (a parent questionnaire or interview) or both should be added. The study will compare differences in population subgroup means (expressed as standard mean differences) adjusted for social context computed for the NAEP background data with similar scores computed from other national surveys of the same age groups conducted in the same year. By using surveys with more complete and more reliable data on social context it will be possible to determine whether the quality of the NAEP background data are adequate to use for social context adjustment of achievement scores.

Fed Id No: 70005
Organization: Rand Corporation
Prncpl Researcher: David Grissmer
Project title: Assessing the Policy Implications of National, Regional and State NAEP Trend Scores

Project: This project makes use of earlier research by the Rand Corporation linked with Census and Current Population Survey data to aggregate NAEP data in order to attach more accurate family and community background information to NAEP achievement scores. This project will update and expand the analysis of NAEP trend data by racial/ethnic groups and address the specific question of whether the minority/nonminority gap is widening and what the potential causes of this effect might be. The project also expands previous analyses to the 9-year-old NAEP population, since changes in family and community and school variables are likely to be reflected first in this population subgroup.

Fed Id No: 70014
Organization: University of Maryland
Prncpl Researcher: James Byrnes
Project title: Explaining Ethnic Differences on the 1992 NAEP for Mathematics

Project: This project will attempt to identify the antecedent variables that are systematically associated with ethnic differences in mathematics performance on the 1992 NAEP. In addition, the project will use item responses and proficiency scores from these data to derive alternative estimates of the size of the ethnicity effect. They authors propose using effect sizes constructed from item responses to corroborate effect sizes constructed from proficiency scores.

Fed Id No: 70006
Organization: University of Southern California
Prncpl Researcher: Eddie Ip
Project title: Exploration and Visualization of the NAEP Database Using Multivariate Multiway Tables

Project: This project will develop a software environment that makes NAEP data more amenable to exploration and analysis by less statistically sophisticated users. Instead of operating directly on the NAEP database, the software to be developed will create an on-line multidimensional data structure which classifies the NAEP data into the cells of a Multivariate multiway table (MMT) and then provides statistical tools that operate on MMT so that information can be promptly extracted and presented to users in graphical form. The products of this research will include a final report and a PC-based prototype program that allows non-technical users to explore and analyze NAEP data.

Fed Id No: 70016
Organization: University of Massachusetts
Prncpl Researcher: H. Swaminathan
Project title: Identification of Factors that Contribute to Differential Performance Among NAEP Test-taking Populations

Projects: This project will focus on techniques for assessing differential performance among racial/ethnic, gender, and socio-economic subgroups of the population when item level data are being used. The project proposes: (a) to develop group comparison procedures at the item level where the measure of interest is nominal or ordinal in nature; (b) to develop multilevel procedures appropriate for identifying factors that contribute to differences between groups of interest when the outcome measure is nominal or ordinal; and (c) to develop software for the statistical analysis of nominal and ordinal level data.

Fed Id No: 70008
Organization: University of Pittsburgh
Prncpl Researcher: Clement Stone
Project title: A Computer Program for Assessing Goodness-of-Fit of Item Response Theory Models to NAEP Data

Project: This project will develop a more precise measure of goodness-of-fit than is currently being used to determine how well NAEP data fit the IRT model on which they are based. The project will develop software which estimates a goodness-of-fit statistic that is appropriate for use with data, such as NAEP, in which the ability measure is imprecisely estimated. The software will both estimate the goodness-of-fit statistic and develop an empirical sampling distribution for that statistic from which the likelihood of the fit statistic can be determined. The project will include a simulation study to test the sensitivity of the procedures being developed to violations of model fit, and an empirical study in which the new software is applied to item blocks from several NAEP subpopulations and the fit of these items to the underlying IRT model is explored.

Fed Id No: 70018
Organization: University of Rochester
Prncpl Researcher: Richard Niemi
Project title: Course-taking Patterns in Social Studies and Their Effects on History Achievement

Project: This project will use the 1994 NAEP High School Transcript Study and the 1994 NAEP History Assessment to investigate the links between students curricular experience and their knowledge of American history. Specifically the study plans to: (a) provide a conceptually rich description of the current social studies coursework across different types of students and schools; (b) to examine the extent of students' knowledge of history in detail, comparing levels of achievement across different types of students and schools, and (c) to establish what, if anything, different course-taking patterns contribute to observable differences in student's knowledge of history after student and school characteristics are taken into account.

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Projects Funded in FY 96

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Organization: Human Resources Research Organization
Prncpl Researcher: Lauress L. Wise
Project title: Assessing the Impact of Low Motivation on NAEP Estimates of Student Achievement

Project: The proposed research will use a model of examinee persistence to detect and account for effects of low motivation on performance on NAEP exercises. The proposed study will examine differences in the performance of equivalent groups of students when a block of exercises is administered at the beginning or at the end of the assessment in order to estimate the impact of a lack of persistence on examinee performance toward the end of the assessment. The Examinee Persistence Model (Wise, 1996) will be extended in the proposed study to include graded response items and use to estimate the impact of low motivation on NAEP results. Differences by subject, grade, exercise, type, and examinee group will be investigated.

Organization: The University of Chicago
Prncpl Researcher: Larry Hedges
Project title: Adjustments of Group Differences for Social Context in NAEP

Project: The proposed study will provide a means for comparing students from different population groups but similar social contexts. It will investigate the possibility of adequately adjusting NAEP trend reports of population group means for differences in social context. Population group differences (expressed as standardized mean differences) adjusted for social context computed from NAEP data will be compared to those computed from other national surveys (HS&B and NELS:88) of the same age groups (17 year-olds) from the same year.

Organization: LMP Associates, Inc.
Prncpl Researcher: Lawrence M. Rudner
Project title: An Indepth look at NAEP Performance Exercises

Project: An increasing proportion of the exercises included in NAEP are performance items. Despite the virtues of such items, serious questions can be raised regarding their impact on different populations of students. The proposed study will investigate both psychometric and equity questions the literature has raised about performance exercises using person-fit statistics. This family of statistics provides a direct measure of assessment accuracy by analyzing the fit of measurement models to an individual's (or group's) response pattern. The proposed analysis will examine the distribution of fit across individuals, look for group and item-type differences, and investigate the practical significance of fit statistics to study performance items.

Organization: The RAND Corporation
Prncpl Researcher: Dan Koretz
Project title: Interpretation and Use of NAEP TSA Results

Project: The proposed study would explore the understanding, presentation, and use of NAEP Trial State Assessment results by policymakers and the lay media. A secondary objective is to explore whether new ways of reporting NAEP results might improve their understandability and encourage accurate interpretations by policymakers and the press.

Organization: De Montfort University
Prncpl Researcher: Nicholas Longford
Project title: Small Area Estimation of State-level means. Pooling information across State Assessments.

Project: This proposed project will explore the application of small-area methods to estimating the population and sub-population means in the NAEP Trial State Assessment surveys and will formulate general principles underlying shrinkage estimation in the context of a collection of surveys with a common sampling design. Data from the latest NAEP Trial State Assessment and from a sequence of U.S.-wide surveys of an age / grade and an academic subjects will be

used to develop and implement the methods. The programming developed (using the SPLUS statistical programming environment) will be published in the report.

Organization: Educational Testing Service
Prncpl Researcher: Howard Wainer
Project title: How Can We Improve Display Methods for NAEP Results?

Project: This proposed project would evaluate the extent to which the use of more evocative data displays can improve communication with some crucial members of NAEP's audience. This will be accomplished by comparing, within a survey of two groups of NAEP users, the comprehensibility of existing NAEP data, displays, and principle tables with some recently developed alternatives. Approximately 100 ninety-minute interviews will be conducted with policy-makers and educators where selected displays from the 1992 and 1994 NAEP Executive Summary and First Look Reports as well as revised displays will be shown.

Organization: Educational Testing Service
Prncpl Researcher: Russell Almond
Project title: NAEP-VUE: A Visual Environment for Modelling NAEP Data

Project: The proposed research will design and develop the NAEP Visual Understanding Environment (NAEP-VUE). This computer environment will contain three components: variable definition tools; model specification and selection tools; and model interpretation and comparison tools. These modules will build-in NAEP-specific statistical and data collection expertise not typically available to secondary analysts, and by doing so, substantially improve the average educational researcher's ability to make appropriate use of the NAEP data.

Organization: Advance Research and Data Analyses
Prncpl Researcher: Jamal Abedi
Project title: The Impact of Linguistic Complexity of NAEP Items on 8th-grade Students' Performance.

Project: The proposed study intends to answer concerns regarding the impact of students' language background on their academic performance by analyzing identifying linguistic features in NAEP items that may affect performance of students with language backgrounds other than standard English. Science, math, and geography were selected because content knowledge and not language capability is the intended target of assessment. Categorization of test items into complex and non-complex will be done using a linguistic rubric and the characteristics of the items in the 1992 and 1994 NAEP main assessment. Students' performance on these two groups of items will be compared across groups of students formed based on their background variables including language background. The second part of the study will entail a differential item function (DIF) Analysis on the NAEP test items using language related variables.

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Projects Funded in FY 95

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Organization: Michigan State University
Prncpl Researcher: Stephen Raudenbush
Project title: Methodological Alternatives in the Analysis of Data from NAEP

Project: This project proposed to develop alternative strategies for coping with the complexity of the NAEP data which are statistically efficient, robust, cost efficient, and user-friendly. These goals will be realized by the development and testing of six computational methods for within state analysis of the NAEP data and three computational approaches for combining NAEP results across states. This project will develop new software which permits the analysis NAEP data using: OLS regression, two-level hierarchical models, three-level hierarchical, models and multivariate Bayes linear model estimation for between-state comparisons.

Organization: Educational Testing Service
Prncpl Researcher: Nicholas Longford
Project title: Population Summaries for Constructed Response Items in NAEP

Project: The goal of this project is to develop a comprehensive framework for the analysis of scores on subjectively rated (constructed-response) items in the context of the NAEP design. The focus will be on the estimation of population and subpopulation means and their sampling variances. The approach to be developed will combine score adjustment schemes and rater reliability models previously developed by the principal investigator with model-based variance estimation procedures also developed by the principal investigator. Data from constructed response sections of the 1994 NAEP surveys will be used to develop and illustrate the methods and to assess their impact on inferences that are of principal interest to NAEP researchers and analysts. New software will be developed to implement the new scoring procedures.

Organization: University of Chicago
Prncpl Researcher: Kenneth Wong
Project title: Relation of State Education Reform to Instructional Practices & Student Outcomes: Implications for Narrowing the Learning Gap in Math

Project: This study proposed to examine whether and how between state differences in systemic education reform are associated with interstate variation in average math performance as well as the social and racial distribution of math proficiency. The study will use item response theory (the Rasch measurement model) to measure state activism in reform issues, will identify state-level policy variables that affect school and classroom implementation, and finally develop hierarchical linear models to investigate the relationship between state reform policy, instructional practices and student achievement outcomes.

Organization: George Mason University
Prncpl Researcher: David Armor
Project title: Measuring Socio-Economic Effects on Academic Performance

Project: This study proposed to conduct secondary analyses of the NAEP national assessments from 1988 and 1994 in order to determine the specific nature of the relationships between socioeconomic and other home background characteristics on academic performance. Preliminary analyses have revealed that the precise nature of the SES specifications can affect the magnitude of the SES-achievement relationship and that this relationship may not be uniform for all racial and ethnic groups. This project proposes to analyze of the relationship between SES and achievement in NAEP to estimate the strength of the relationships, the ways in which SES measures should be scored or transformed to represent their full effects, the theoretical implications of alternative models for incorporating SES effects in multivariate analyses (e.g., traditional regression versus hierarchical models), and the extent to which any of these specifications vary across differing NAEP tests, age groups or assessment years. To the extent that any of the relationships between SES and achievement reflect measurement problems, the project will make recommendations to NCES about ways to improve the assessment of home background variables.

Organization: Mississippi State University
Prncpl Researcher: Melvin Franks
Project title: The Impact of Computers, Instruction, and Time on NAEP-TSA Mathematics Achievement in Selected Southeastern States.

Project: This project proposed to analyze and report on the data from the 1992 NAEP Trial State Assessment in three southeastern states. The primary purpose of the project is to develop a model for analyzing state data that researchers in state agencies will find easy to use and powerful in output. The demonstration project proposed in this study will hierarchical linear models to investigate the relationship between the use of computers in the classroom, the delivery of mathematics instruction, and the time spent on mathematics and the mathematics proficiency of fourth and eighth grade public school students in Louisiana, Mississippi, and North Carolina. A conference and training session will be held to introduce state testing agencies to models developed under the grant.

Organization: Northwestern University
Prncpl Researcher: Bruce Spencer
Project title: Effects of School Nonparticipation in NAEP

Project: This project proposed to assess the impact of school nonresponse on the quality of NAEP proficiency estimates. The project will analyze and estimate nonresponse bias in certain key NAEP assessment statistics. The study will collect, from approximately 30 State Departments of Education, statewide assessment data for all public schools for grades 4, 8, and 12 in mathematics, reading and where possible, in science. These data will be used to predict what NAEP would measure for these schools. By comparing participant and nonparticipant schools in a sample, the study will determine the effect of school nonparticipation on statistics computed from the sample and produce a precise estimate of the nonparticipation bias. With

this information, the study will be able to determine what fraction of nonparticipation bias is removed by school substitution, what fraction is removed by current weight adjustments and what fraction would be removed by alternative weighting methods. The study will also estimate the relation between nonparticipation rate and nonparticipation bias.

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Projects Funded in FY 94

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Organization: Michigan State University
Prncpl Researcher: Stephen Raudenbush
Project title: Correlates of State Variation in the Social Distribution of Achievement: A Bayesian Analysis

Project: This project proposed to develop new statistical methods for synthesizing results from multiple states while addressing substantive educational policy questions using the 1992 Trial State Assessment eighth grade mathematics data. The substantive component of the project will describe and explain state-to-state differences in 1) mean level of overall mathematics proficiency; 2) proficiency gaps between ethnic groups; and 3) proficiency gaps between more and less socially advantaged students. The methodological component will develop and refine statistical methods for combining and comparing school effects data tailored for NAEP.

Organization: MPR Associates, Inc
Prncpl Researcher: Phillip Kaufman & Mark Wilson
Project title: Relationship between School Level Variables and Student Risk Characteristics: a Comparison of Multi-level Approaches

Project: This project proposed to: (1) use hierarchical linear modeling to identify school, teacher, family and student correlates of mathematics and reading achievement for students deemed "at risk" for school failure using the 1992 NAEP reading and mathematics data, (2) develop an alternative to the standard plausible value methodology employed by NAEP (called a multilevel item response model) and adapt software to implement these developments, and (3) to conduct analyses of the data from the first two components to explore the relative merits of the multilevel approach compared to the plausible values approach.

Organization: Westat, Inc
Prncpl Researcher: Trevor Williams
Project title: (None)

Project: This project proposed to use the NAEP Transcript Study and the 12th grade NAEP proficiency scores to determine whether differences in course-taking patterns among students are associated with differences in student achievement and whether such differences are associated with differences in state and local academic requirements.

Organization: University of Minnesota
Prncpl Researcher: Mark Davidson & Ernest Davenport
Project title: Utilizing Profile Analysis via Multidimensional Scaling to Ascertain Patterns in Course Taking Behavior

Project: This project proposed applying Profile Analysis via Multidimensional Scaling (PAMS) to the 1991 Transcript study data to identify the major patterns of student course taking in math and science. This analysis will permit an evaluation of the utility of PAMS for use with the NAEP data and will yield substantive information regarding: (1) subgroup differences in course-taking patterns and (2) relationships between course-taking patterns and academic achievement.

Organization: Educational Testing Service
Prncpl Researcher: Neal Thomas
Project title: Sensitivity of Model-based Inference in NAEP

Project: Much of the NAEP reporting involves the outermost percentages and percentiles of student performance. In these regions, the regression models used to create the NAEP imputed values become increasingly sensitive to the assumptions of linearity, normality and variance homogeneity. This project proposed exploring the sensitivity of scale score reporting to the assumptions of the statistical models used to create the scale scores.

Organization: University of Michigan
Prncpl Researcher: Valerie Lee
Project title: Course-taking, Equity and Math Learning: The Role of the Academic Organization of American Secondary Schools

Project: Previous research provides strong evidence that favorable student outcomes are more likely to occur in high schools that require all students to take a restricted academically-oriented set of courses. This study proposed a test of the "delimited academic organization" hypothesis using the 1991 NAEP Transcript Study and the 1990 NAEP mathematics data. The study will use these data in hierarchical linear models to examine the relationship between the organization of the high school mathematics curriculum and: (a) student mathematics achievement and (b) the differentiation of mathematics achievement across student populations .

Organization: Educational Testing Service
Prncpl Researcher: Howard Wainer
Project title: A Study of Display Methods for NAEP Results

Project: This project proposed to develop improved approaches to displaying the massive amount of data gathered in NAEP and thereby make the data more communicative. The researchers will demonstrate their developments by examining substantive questions: 1) is there a relationship between family structure and NAEP performance that is obscured by a

statistical anomaly? 2) is there a relationship between students' proficiency and per pupil expenditure? and 3) what is the size of the causal effect of family structure on students performance?

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Projects Funded in FY 92

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Organization: MPR Associates, Inc.
Prncpl Researcher: Carolyn Arnold
Project title: Correlates of Mathematics Achievement in 1990 NAEP

Project: Using the 1990 NAEP mathematics data in all three grades, this project used hierarchical linear models (HLM) to identify school, teacher, family and student correlates of overall mathematics achievement, and achievement on the NAEP subscale representing higher-level mathematics applications. In addition, this project developed new statistical software that facilitates the use of HLM with NAEP data.

Published: NCES Research and Development Series January 1995--"Using HLM and NAEP Data to Explore School Correlates of 1990 Mathematics and Geometry Achievement: Methodology and Results"

Organization: LMP, Associates, Inc.
Prncpl Researcher: Lawrence Rudner
Project title: Use of Fit Statistics in Analyzing and Reporting NAEP Results

Project: This project investigated the use of a weighted-total-fit-mean-square as a measure of assessment accuracy using data from the 1990 NAEP. Analysis of the accuracy of NAEP by groups and item types can lead to a better understanding of the current data and to more accurate future analyses. This project analyzed the fit response patterns to the measurement model across individuals, looked for group and item-type differences, and investigated the practical significance of the weighted-total-fit-mean-square.

Published: NCES Research and Development Series January 1995--"Using Person-Fit Statistics in Reporting and Analyzing National Assessment of Educational Progress Results"

Organization: Educational Testing Service
Prncpl Researcher: Nicholas Longford
Project title: Model Based Substitutes for Jackknife Analysis in NAEP

Project: Because large scale surveys such as NAEP employ complex sampling designs resampling methods such as jackknife or bootstrap must be used to estimate the precision of student achievement. This project investigated the use of hierarchical linear models to estimate standard errors for student proficiency scores. If this research sought to demonstrate that the computationally intensive jackknife procedure currently used in NAEP could be replaced by model-based procedures which are statistically more efficient and less dependent on iterative computer re-estimation.

Published: NCES Research and Development Series January 1995--"Model-Based Methods for Analysis of Data from 1990 NAEP Trial State Assessment"

Organization: Boston College
Prncpl Researcher: Albert Beaton
Project title: The NAEP Primer

Project: This project developed a NAEP Primer designed to make the NAEP data and the techniques required to use it properly readily available to the community of educational researchers and policy-makers. The experienced statistician or psychometrician can use the Primer to find out what data are available; how to access the data; and the special approaches required in NAEP data analyses. The NAEP Primer also addresses the concerns of policy analysts who rely on available statistical systems to analyze data. For policy-analysts, the Primer demonstrates simple and appropriate ways to use subsets of the NAEP data with available statistical systems as well as introduce these analysts to advanced techniques. The Primer focused on the 1990 NAEP data, with abbreviated coverage of the other available NAEP data. The NAEP Primer contains many worked examples of basic and advanced data analyses.

Published: Center for the Study of Testing, Evaluation, and Educational Policy, Boston College, 1995--"The NAEP Primer"

Organization: American Institutes for Research
Prncpl Researcher: Donald McLaughlin
Project title: NAEP Analysis

Project: Four overlapping projects using the 1990 NAEP Trial State Assessment data were conducted under this grant. These projects: (1) tested hypotheses about the impact of educational policies in different states by analyzing the relationship between the characteristics of mathematics courses, teachers' qualifications, and student performance; (2) evaluated methods for increasing the amount of information extractable from students' responses to the NAEP items; (3) developed analytical methods that will allow the Trial State Assessment data to contribute to the precisionof national estimates generated by NAEP; and (4) created an analysis training package for use in other researchers how to make appropriate inferences from NAEP data.

Results Unpublished.